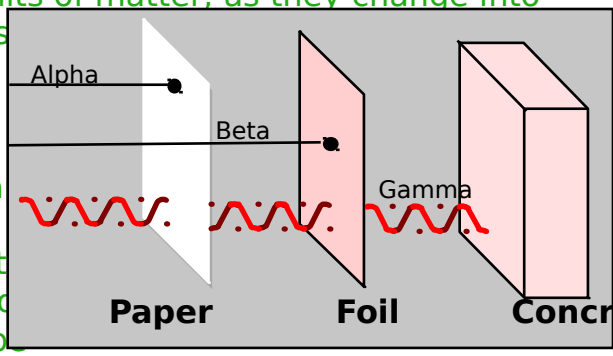
US Army Corps of Engineers

FACT SHEET

The Basics of Radiation

The Nature of Radiation

Radiation is a naturally occurring type of energy. It is released by unstable forms of atoms, the basic units of matter, as they change into more stable forms. The energy releas



Alpha particles are the largest and slowest atomic particles. They can travel only a few inches through air. They can be stopped by a sheet of pa or the outer layers of skin.

Beta particles are smaller and faster t alpha particles but can travel only abo 10 feet through air. They can easily b stopped by a thin shield such as a sheet of aluminum foil.

Gamma radiation consists of gamma rays rather than atomic particles. Gamma rays are a type of electromagnetic wave, much like X rays, and move at the speed of light. They travel farther through air than alpha or beta particles but can be stopped by a thick shield of lead, steel, or concrete.

Radiation cannot be seen, heard, smelled, or tasted. However, it can be detected and measured by instruments such as Geiger counters, dosimeters, and similar devices. Levels of radiation are expressed in several different units. One of the most useful is the rem, which measures radiation dose in terms of its potential health effects on persons who might be exposed to it.

Small amounts of radiation dose are expressed in millirems (thousandths of a rem), abbreviated as mrem. For example, a chest X ray produces a dose of about 40 mrem, a back X ray about 3,000 mrem, and a dental X ray about 150 mrem.

Sources of Radiation

Sources of radiation include the soil and the food we eat. It also reaches us as cosmic radiation from outer space. For example, a resident of Denver, Colorado, receives about 50 mrem per year from cosmic radiation and another 63 mrem per year from the ground surface. Food accounts for about 20 mrem of our annual radiation exposure.

Natural and synthetic substances that emit radiation are called radioactive materials. Many buildings contain naturally occurring radioactive materials. For example, radioactive elements in

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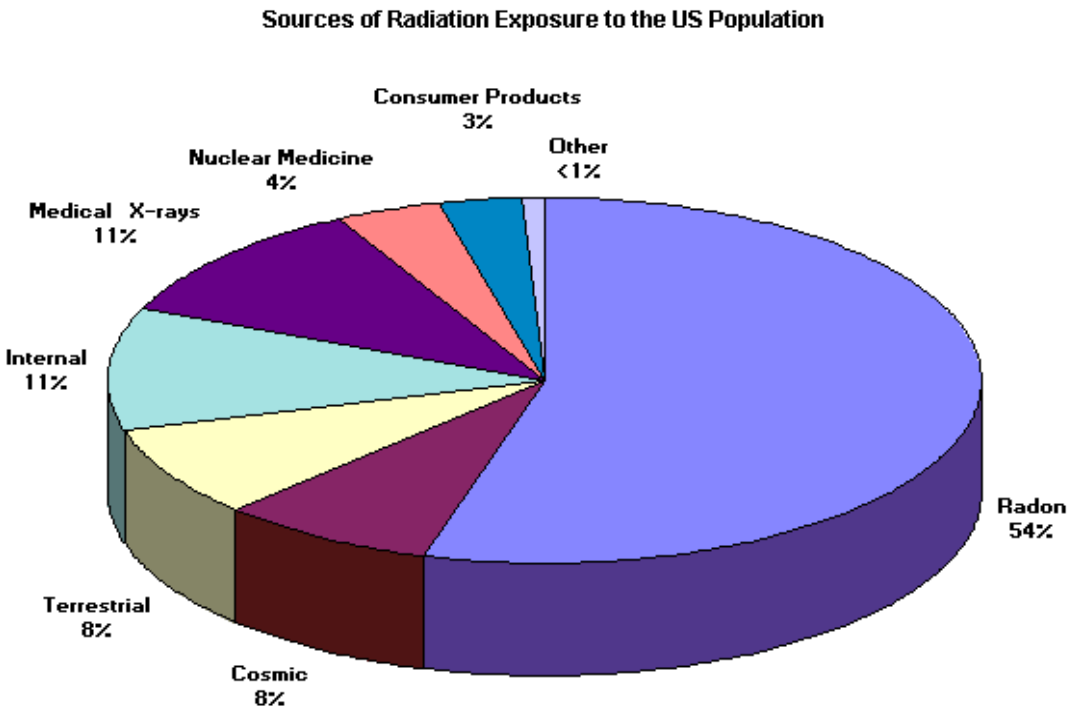
Some consumer products are also sources of radiation. A person who smokes two packs of cigarettes per day receives 8,000 mrem per year. Smoke detectors produce about 1/100 mrem per year. Certain household appliances such as color television sets and microwave ovens also produce very small amounts of radiation. On the average, consumer



Radiation Protection

The first step in radiation protection is to determine the levels of radioactivity at the site and in surrounding areas. Air, water, soil, or other routes by which radioactive materials could spread are identified and monitored. At many sites, access restrictions minimize exposure of the public to radioactive materials. Proper storage methods are often used to keep contaminants from leaving the site through water or soil.

The amount of radiation that can leave the boundaries of sites with radioactivity is kept to levels as low as reasonably achievable. Thus, the exposure a member of the general public can receive as a result of radiation from sites is very low. The maximum allowable exposure is 100 mrem per year above background levels. By comparison, the average American receives about 360 mrem per year from background radiation and medical exposure.

For more information call (402) 697-2592 U.S. Army Corps of Engineers–Radiation Safety Support Team.